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A

PATENT APPLICATION TRANSMITTAL LETTER

Case Docket No.: M-95-3195-U.20-CIP

To:

THE COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231-9998

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09/641790  
08/18/00

Sir:

Transmitted herewith for filing is the patent application of

INVENTOR: Carlos Neto MENDES

FOR: "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM and CONFIGURATION FOR A  
SELF-CLEANING FILTER FOR THE EXTRACTION OF FRUIT JUICE"

Enclosed are:

(XX) EIGHT (8) Sheets of Drawing Figures (FIGURES 1 - 13).

( ) An assignment of the invention to \_\_\_\_\_

( ) A certified copy of a \_\_\_\_\_ application.

( ) An associate power of attorney.

(XX) A verified statement to establish small entity status under 37 CFR 1.9 and  
37 CFR 1.27.

The filing fee has been calculated as shown below:

	(Col. 1)	(Col. 2)
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TOTAL CLAIMS	46 - 20 =	* 26
INDEP CLAIMS	10 - 3 =	* 7
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SMALL ENTITY		OR	OTHER THAN A SMALL ENTITY	
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PATENT APPLICATION TRANSMITTAL LETTER  
Page 2 of 2

Attorney Docket No.: M-95-3195-U.20-CIP

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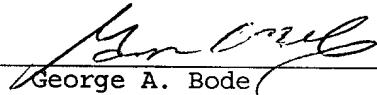
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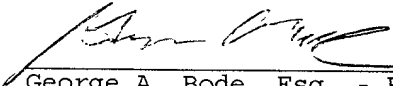
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George A. Bode  
Attorney of Record  
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Applicant or Patentee: Carlos MENDES Neto Attorney's  
Serial or Patent No.: \_\_\_\_\_ Docket  
Filed or Issued: \_\_\_\_\_ No.: M-95-3195-U,20-CIP  
For: "Improvements In A Modular ... Extraction Of Fruit Juices"

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS (37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled same as "For" above, described in

- (X) the specification filed herewith.  
( ) application serial no. \_\_\_\_\_, filed \_\_\_\_\_.  
( ) patent no. \_\_\_\_\_, issued \_\_\_\_\_.

I have not assigned, granted, conveyed, or licensed and am under no obligation under contract or law to assign, grant, convey, or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

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I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issued thereon, or any patent to which this verified statement is directed.

Carlos MENDES Neto  
NAME OF INVENTOR NAME OF INVENTOR NAME OF INVENTOR  
  
Signature of Inventor Signature of Inventor Signature of Inventor  
11 July 2000  
Date Date Date

APPLICATION FOR  
U.S. LETTERS PATENT  
FOR

"IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION  
SYSTEM and CONFIGURATION FOR A SELF-CLEANING  
FILTER FOR THE EXTRACTION OF FRUIT JUICE"

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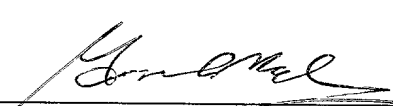
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This application is a continuation-in-part  
application of the previous applications by the same  
inventor listed in Schedule A which is attached to the  
Inventor's Declaration.

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George A. Bode, Esq.  
Reg. No. 30,028

**"IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION  
SYSTEM and CONFIGURATION FOR A SELF-CLEANING FILTER FOR  
THE EXTRACTION OF FRUIT JUICE"**

5 This application is a continuation-in-part  
application of previous applications by the same inventor  
bearing:

10 1) U.S. Serial No. 08/647,066 filed May 9, 1996,  
(which claims priority, under 35 U.S. Code § 119 based on  
Brazilian Application No. PI-9502244-9 filed June 19,  
1995), now U.S. Patent No, 5,655,441 issued August 12,  
1997;

15 2) U.S. Serial No. 08/681,627 filed July 29, 1996,  
(which claims priority, under 35 U.S. Code § 119 based on  
Brazilian Application No. MI-5501198-5 filed August 1,  
1995) now U.S. Patent No, 5,720,218 issued February 24,  
1998;

20 3) U.S. Serial No. 08/681,626 filed July 29, 1996,  
(which claims priority, under 35 U.S. Code § 119 based on  
Brazilian Application No. MU-7501779-2 filed August 1,  
1995);

4) U.S. Serial No. 08/759,723 filed December 6,  
1996, (which claims priority, under 35 U.S. Code § 119  
based on Brazilian Application No. MU-7502784-4 filed  
December 8, 1995);

5) U.S. Serial No. 08/759,722 filed December 6, 1996, (which claims priority, under 35 U.S. Code § 119 based on Brazilian Application No. MU-7502785-2 filed December 8, 1995) now U.S. Patent No, 5,720,219 issued February 24, 1998;

6) U.S. Serial No. 08/759,727 filed December 6, 1996, (which claims priority, under 35 U.S. Code § 119 based on Brazilian Application No. MU-7502786-0 filed December 8, 1995);

7) U.S. Serial No. 08/763,679 filed December 11, 1996, (which claims priority, under 35 U.S. Code § 119 based on Brazilian Application No. MU-7502994-4 filed December 15, 1995);

8) U.S. Serial No. 08/884,529 filed June 27, 1997, (which claims priority, under 35 U.S. Code § 119 based on Brazilian Applications No. PI-9502218-0 filed June 12, 1995; No. PI-9502244-9 filed June 19, 1995; No. MI-5501197-7 filed August 1, 1995; No. MI-5501198-5 filed August 1, 1995; No. MI-5501199-3 filed August 1, 1995; No. MU-7501779-2 filed August 1, 1995; No. MU-7501780-6 filed August 1, 1995; No. MU-7501781-4 filed August 1, 1995; No. PI-9503518-4 filed August 1, 1995; No. MU-7501563-3 filed August 7, 1995; No. PI-9503109-0 filed



and,

11) U.S. Serial No. 09/377,937 filed August 20, 1999, (which claims priority, under 35 U.S. Code § 119 based on all of the applications in Items 1 - 9 above).

5 The entirety of these previous applications are incorporated herein by reference as if set forth in full below.

The present patent of invention refers to both "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM and CONFIGURATION FOR A SELF-CLEANING FILTER FOR THE EXTRACTION OF FRUIT JUICE." For "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM" or be it, as the nomenclature implies, a system developed with the purpose of obtaining juice from citrus fruit such as orange, grapefruit, lemon, lime, tangerine, mekan, pokan, etc., and other round or near-round non-citrus fruit. The important characteristics of the present system includes: compactness, modularity, durability, simplicity and the highest quality of the juice obtained form extraction. For "CONFIGURATION FOR A SELF-CLEANING FILTER FOR THE EXTRACTION OF FRUIT JUICE" or more fully, "IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," or



be it, as the nomenclature implies, a cylindrical filter constructed of stainless steel or other food grade, nontoxic materials developed with the purpose of obtaining juice from citrus fruit such as orange, grapefruit, lemon, lime, tangerine, mekan, pokan, etc., and other round or near-round non-citrus fruit. The important characteristics of the present configuration includes: better filtration efficiency, greater juice yield as well as increased self-cleaning and sanitization characteristics obtained due to its design, compactness and simplicity thus contributing further to increase juice quality and juice yield as obtained in fruit juice extraction processes.

#### **THE STATE OF THE ART**

The state of the art is known from previous patents by the same inventor, including US Patent 5,655,441, Patent 5,720,218, Patent 5,720,219 and Patent 5,802,964, which revolutionized the market by introducing a method of juice extraction which eliminated the traditionally bitter tastes in citrus juices, by eliminating the contact of peel with the juice being extracted.

This equipment primarily based its advantages in the process of peeling the fruit before juice extraction, by

means of a fixed peeler cup (concave and radially cut hemisphere) and by meshing with an identical movable peeler cup (concave and radially cut hemisphere), which in their relative motion act together to shear the peel in longitudinal strips. Immediately after, the core of the fruit enters a filtering device which allows juice to pass through its radially cut slits, and is collected into a juice collector which has an lower side opening on one of its ends, so that it allows the juice to, by gravity, flow into a collecting juice tank. The dried fruit core is then pushed, by a plunger, back in the direction of the filter's opening, in a manner that expels the core completely, allowing the core to drop vertically through the peeler cups and into the peel and core reservoir or transport devices.

In the above described fruit juice extraction process, cylindrical filters with radial slits are used. These filters include at their front end a sharp knife-edged cylindrical cutting point that perforates the fruit at a point in the compression stage of said fruit, 20 permitting that shearing of the fruit peel can be achieved while simultaneously transforming the fruit from its hemispherical shape into peelings, and permitting

that a cylindrically shaped fruit core can be separated from other parts of the fruit and that said fruit core can ultimately be pumped completely into the cylindrical filter with radial slits. Since the cylindrical filter has a multitude of radial slits along its body, this allows the juice to flow through said slits and gravitate into a space around the filter defined as the juice collector chamber. Since the juice collector chamber has an opening at one of its ends, the juice is able to flow through the opening and fall into a juice reservoir, which is placed directly underneath said juice collector.

In the juice extraction systems described above, the cylindrical filters are subject to continuous duty operation where the perforating cutting edged points are subject to wear and damage while the remainder of the filter is protected from such possible break downs. Also the parallel shaped slits, while permitting juice to flow through, will occasionally clog and cause higher pressures in the chamber to occur, thus decreasing filtration performance. The filter must therefore be taken out for cleaning and sanitization in order to return to its optimal performance capabilities.

Other advances have been introduced in this system

and have been the object of other patents and patent applications, nevertheless, always encompassing the original scope of the basic invention.

#### OBJECTIVES OF THE INVENTION

5           The present invention in "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM" maintains the primary characteristics of the original patents, nevertheless, its objective is to propose a unique modular configuration where the movement of the movable peeler  
10 cups, within the scope of a modular system, is configured in a manner that fruit juice can be extracted at both ends of this basic module and the linear drive motion of the moveable peeler cups is configured such that both movable peeler cups can be driven by a single linear  
15 actuator. This solution not only generates a large cost/benefit advantage since the productivity of each complete extraction cycle is doubled, it also generates a singular and innovative basic module that can be aligned in parallel with other basic modules, or any  
20 other geometrical configurations, in manners that large numbers of these modules can be placed and arranged to multiply greatly the total productivity of small, medium or large fruit juice production plants.

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The quality and organoleptic characteristics of the juice extracted is maintained as described in the original patents, and greatly improved in relation to older technologies, be it those of small, medium or large scale machinery. The high degree of modularity, and therefore scaleability, is an important benefit of the invention here proposed, as it facilitates and permits growth of productivity on a modular basis, allowing for an initial single module to be used and permitting that, over time, many, perhaps 100 or more, modules can be installed in juice production facilities, permitting flexible and economic growth of one's juice production plant. This is an important feature of this invention because this permits smaller scale juice production facilities to grow to extremely large, multi-million-gallon per year juice plants, and, independently of size or production capabilities, to gain the advantages of the quality and organoleptic improvements in the juice extracted.

In general terms, the objective of this invention is a concept of a machine composed of two pairs of peeler cups where for each fixed peeler cup, attached to the basic structure of the machine, and an equivalent and

matching moveable peeler cup is fixed to opposite ends of  
a single linear actuator that drives, in a back and forth  
cycle, both movable peeler cups. In this configuration,  
the system is composed of a single moveable peeler cup at  
5 each of the extreme ends of the linear actuator, driven  
in a manner that one maximizes the utilization and  
productivity of the drive motion, since as one moveable  
peeler cup is opening to allow a fruit to fall within its  
concave and radially cut chamber, formed in conjunction  
10 with its matching fixed peeler cup, the moveable peeler  
cup at the opposite end is closing upon the fruit inside  
the chamber and shearing the fruit's skin as it initiates  
the peeling process and continues on to complete the  
juicing cycle by pumping the fruit's core into the  
15 filtering device. This configuration therefore permits  
significant economies of space, complexity, weight,  
energy and costs, and assures a simple basic modular unit  
for use in multiple numbers, limited only by the desired  
juice production capacity, which varies greatly from  
20 customer to customer.

By utilizing a simple linear actuator concept for  
driving the moveable peeler cups, one can employ various  
drive technologies, including hydraulic, pneumatic,

electric, geared, screw and/or any combination of known  
linear drive systems. Since the drive movement is  
restricted to a simple linear back and forth action, one  
can assure greater simplicity of construction and  
5 therefore greater reliability, less energy consumption,  
lower weight and lower manufacturing costs with this  
invention, as compared to older nonlinear actuation  
systems that employ, cams, cam followers, gearboxes,  
electrical motors, levers, springs, and other  
10 complicated, more numerous and less reliable and more  
costly devices and systems.

The present invention in "CONFIGURATION FOR A  
SELF-CLEANING FILTER FOR THE EXTRACTION OF FRUIT JUICE"  
maintains the primary characteristics of the original  
15 patents, nevertheless, its objective is to propose a  
simple and unique configuration that improves filtration  
performance and adds to operational flexibility,  
increases filter life and contributes significantly to  
improving the cost/benefit and economic performance of  
20 this important component in the fruit juice extraction  
process. The quality and organoleptic characteristics of  
the juice extracted is maintained as described in the  
original patents, and greatly improved in relation to

older technologies, be it those of small, medium or large scale machinery.

To generate the improvements describe above, the present invention proposes a configuration that consists  
5 of a removable cylindrical perforating cutting edge which is attached, by threads or other methods, to a main cylindrical body of the filter which has a multitude of transverse radial slits with conical, or V-shaped, formats. These conically shaped transverse radial slits  
10 are positioned parallel with respect to each other and, can be spaced and sized variably, dependent on the juice product desired to be produced. The proposed invention functions by first perforating the fruit's peel in a manner such that permits the pumping action of a moveable peeler cup (a concave and radially cut hemisphere) to  
15 force a core section of fruit to enter completely into said filter, where simultaneously, due to the high pressure generated by the action, the juice is forced to flow through the multitude of conically shaped transverse radial slits that are positioned parallel with respect to  
20 each other, thus separating and filtering the liquid juice from solid components of the fruit. The removable cylindrical perforating cutting edge simplifies



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5 replacement and permits for interchangeability with  
differently shaped cutting edges which can vary as  
desired in order to obtain better juice extraction  
performance on the many varieties of citrus and other  
fruit.

Other important improvements obtained from this  
invention are greater efficiency and yield in juice  
extraction, as a function of the conical, or V-shaped,  
profile of the multiple transverse radial slits, since  
10 this shape generates a greater pressure differential  
between the inside and outside portions of the filter, in  
fact, inducing a "Venturi Effect" which accelerates fluid  
flow from the inside to the outside of the filter, thus  
promoting greater juice yield and greater productivity  
15 and helping greatly to maintain these passageways clear  
of obstructions and reducing clogging and cleaning  
frequency.

#### ADDITIONAL CONFIGURATIONS

The present invention in "IMPROVEMENTS IN A MODULAR  
20 FRUIT JUICE EXTRACTION SYSTEM" contemplates various  
interchangeable versions or embodiments of detailed  
configurations, differences mostly are related to the  
peeler cups, expulsion of the fruit's core through one of



plunger to move linearly inside the filtering device,  
pushing the fruit's core until it has reached the opening  
of the filter and overshooting until the core is totally  
expelled and permitted to fall vertically within and  
5 through the peeler cups and, finally dropping into the  
core receiving duct.

In another embodiment or version, the plunger is  
driven in same manner as twice described before above,  
but the drive is provided by direct force being applied  
10 to the plunger by independent linear actuators mounted  
directly on the machine's basic structure, one at each of  
the opposite extreme ends of said machine.

In a third embodiment or version, the expulsion of  
the fruit's core is through the back side of the movable  
15 peeler cup.

In a fourth embodiment or version, the expulsion of  
the fruit's core through the back side of an internal  
movable peeler cup.

#### **BRIEF DESCRIPTION OF THE DRAWING**

20 The invention will be described in the following  
attached drawing figures, which will illustrate details  
including:

FIGURE 1: A side cross-sectional view of the

invention, as described before, in its first or preferred  
embodiment or version, showing, on the left side, a  
moveable peeler cup in the full open position, as well as  
the expulsion of the fruit's core and its falling into  
5 the fruit core collector duct, as well as the vertical  
falling of the sheared peeled skins. On the right side,  
one can observe the closed position of the moveable  
peeler cup, fully engaged with the fixed peeler cup, as  
well as the juice being filtered through the filtering  
10 device while the fruit's core remains inside the filter  
itself at this point in the extraction cycle. Also shown  
is the juice being collected in the juice collection  
chamber, sheared peel skin strips falling vertically down  
and, finally, dried fruit cores falling further through  
15 the fruit core receiving duct, in a manner that all of  
the byproducts being produced can now be directed  
respectively to other stages of processing;

FIGURE 2: A top view of the embodiment of the  
invention of FIGURE 1 taken along the LINE A-A (or "VISTA  
20 A-A") of FIGURE 1;

FIGURE 3: A front view of the invention of  
FIGURE 1 ;

FIGURE 4: A side cross-sectional view of the

invention, as described before, in its second embodiment or version, showing, on the left side, a moveable peeler cup in the full open position, as well as the expulsion of the fruit's core and its falling into the fruit core collector duct, as well as the vertical falling of the sheared peeled skins. On the right side, one can observe the closed position of the moveable peeler cup, fully engaged with the fixed peeler cup, as well as the juice being filtered through the filtering device while the fruit's core remains inside the filter itself at this point in the extraction cycle. Also shown is the juice being collected in the juice collection chamber, sheared peel skin strips falling vertically down and, finally, dried fruit cores falling further through the fruit core receiving duct, in a manner that all of the byproducts being produced can now be directed respectively to other stages of processing;

FIGURE 5: A top view of the invention, in its second embodiment or version of FIGURE 4 taken along the LINE A-A (or "VISTA A-A") of FIGURE 4. The third embodiment or version is NOT SHOWN in the drawing;

FIGURE 6: A partial perspective view of the main body the filter showing the conical section

transverse radial slits and the removable cylindrical perforating cutting edge as attached to the main body of said filter;

FIGURE 7: A side view of the filter showing the conical section transverse radial slits and the removable cylindrical perforating cutting edge as attached to the main body of said filter;

FIGURE 8: A typical cross sectional view of the main body of the filter;

FIGURE 9: A longitudinal cross sectional segment view of the main body of the filter showing the conical, or V-shaped, nature of the transverse radial slits through which the juice flow through;

FIGURE 10: A side cross-sectional view of the invention, as described before, in its third embodiment or version, showing, on the left side, a moveable peeler cup in the full open position, as well as the expulsion of the fruit's core through the back side of the movable peeler cup and its falling into the fruit core collector duct, as well as the vertical falling of the sheared peeled skins. On the right side, one can observe the closed position of the moveable peeler cup, fully engaged with the fixed peeler cup, as well as the juice being

filtered through the filtering device while the fruit's core remains inside the filter itself at this point in the extraction cycle. Also shown is the juice being collected in the juice collection chamber, sheared peel skin strips falling vertically down and, finally, dried fruit cores falling further through the fruit core receiving duct, in a manner that all of the byproducts being produced can now be directed respectively to other stages of processing;

10                   FIGURE 11: A top view of the embodiment of the invention of FIGURE 10 taken along the LINE 11 - 11 of FIGURE 10;

15                   FIGURE 12: A side cross-sectional view of the invention, as described before, in its fourth embodiment or version, showing, on the left side, external and internal moveable peeler cups in the full open position, as well as the expulsion of the fruit's core through the back side of the internal movable peeler cups and its falling into the fruit core collector duct, as well as  
20                   the vertical falling of the sheared peeled skins. On the right side, one can observe the closed position of the moveable peeler cup, fully engaged with the fixed peeler cup, as well as the juice being filtered through the

filtering device while the fruit's core remains inside the filter itself at this point in the extraction cycle. Also shown is the juice being collected in the juice collection chamber, sheared peel skin strips falling vertically down and, finally, dried fruit cores falling further through the fruit core receiving duct, in a manner that all of the byproducts being produced can now be directed respectively to other stages of processing; and,

10                   FIGURE 13: A top view of the embodiment of the invention of FIGURE 12 taken along the LINE 13 - 13 of FIGURE 12.

**DETAILED DESCRIPTION OF THE INVENTION**

15                   The "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," object of this application for patent of invention, consists essentially of a modular system shown in four optional and functionally interchangeable embodiments or versions, which vary in the drive configuration of the plunger, its function being to expel the dried fruit core and, in so doing, clear the way for receiving a new fruit to be juiced; and the means for expelling the fruit's core through the back side of a movable peeler cup.

20





these vertical rods will touch and initiate a linear dislodging of the feeder mechanism's spring (5), thus allowing one of the fruit (19) to drop through the feeder duct and into the chamber formed by the intermeshing of the moveable peeler cup (4) and its matched pair fixed peeler cup (3).

In continuation of the extraction cycle, the fruit (19) now held in the chamber formed by the intermeshing of the moveable peeler cup (4) and its matched pair fixed peeler cup (3), is then pressed by the moveable peeler cup (4) into the fixed peeler cup (3), since both have multiple radially cut openings, the action causes the skin of the fruit to be sheared in multiple strips (12) which pass through the peeler cups' radial openings and fall vertically, while the fruit's core (13) is taken inside the filtering device (7 or F) since this filtering device has a circular sharp cutting point at its forward opening, permitting the fruit's core (13) to enter completely into the filter (7), which has radially cuts slits which allow for the extracted juice (11) to flow through and be collected in the space formed by the inside of the fixed peeler cup (3) and the juice collector (10).



cups, the juice extraction cycle is exactly identical and fully described above.

In the second embodiment or version of this invention, there is an alternate way of driving the plunger (8), but the fruit juice extraction cycle is the same as in the first version described above. As shown in FIGURES 4 and 5, a linear actuator (2) drives two moveable peeler cups (4), each attached to one of the two extreme ends of the linear actuator (2) and guided linearly by the guide rails (17) which slide on bearing seats (18) mounted transversely and coincidentally with each other, being that the moveable peeler cups (4) move in the direction of the fixed peeler cups (3) which in turn are firmly attached to a structural chassis (1), while the motion of said moveable peeler cups (4) is solidly transmitted to vertical rods (6), in a synchronized manner such that these vertical rods will touch and initiate a linear dislodging the feeder mechanisms spring (5), thus allowing one of the fruit (19) to drop through the feeder duct and into the chamber formed by the intermeshing of the moveable peeler cup (4) and its matched pair fixed peeler cup (3). In continuation of the extraction cycle, the fruit (19) now

held in the chamber formed by the intermeshing of the  
moveable peeler cup (4) and its matched pair fixed peeler  
cup (3), is the pressed by the moveable peeler cup (4)  
into the fixed peeler cup (3), since both have multiple  
5 radially cut openings, the action causes the skin of the  
fruit to be sheared in multiple strips (12) which pass  
through the peeler cups radial openings and fall  
vertically, while the fruit's core (13) is taken inside  
the filtering device (7) since this filtering device has  
10 a circular sharp cutting point at its forward opening,  
permitting the fruit's core to enter completely into the  
filter (7), which has radially cuts slits which allow for  
the extracted juice (11) to flow through and be collected  
in the space formed by the inside of the fixed peeler cup  
15 (3) and the juice collector (10). In the final stages of  
the extraction cycle, driven by the action of linear  
actuator (2), the moveable peeler cup (4) moves back and  
away from the fixed peeler cup (3), and since it is  
solidly fixed to a transverse cross member (20), causes  
20 the simultaneously driving of said cross member (20),  
which in turn is attached through the pull rods (15) to  
another transverse cross member (9) at the opposite end,  
to which plunger (8) is firmly fixed, thus driving said

plunger (8) to travel through the filter and push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter (7) and, finally, the dried fruit core (13) falls into  
5 and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively  
10 to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Given that the geometry and configuration is as shown, one can see that the pair of peeler cups (3) and (4) at one end  
15 of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical and fully described above.

20 It can be understood that there is yet another manner of driving the plunger (8) (although NOT shown in FIGURES 1 - 5), that is by placing a linear actuator fixed directly to structural chassis (1) and attaching

the driving end of said actuator to plunger (8), one can drive said plunger (8) to travel through the filter (7) and push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Given that the geometry and configuration is as shown, one can see that the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical and fully described above.

The invention also includes, in all configurations and versions, clean-in-place spray nozzles (21) mounted at different positions on structural chassis (1), in a

manner such that liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic cleaning of the machine at predetermined time periods as deemed necessary.

5           The "IMPROVED CONFIGURATION FOR A SELF-CLEANING  
FILTER WITH REMOVABLE PERFORATING POINT FOR THE  
EXTRACTION OF FRUIT JUICE," object of this application  
for utility patent, consists of a cylindrical filtering  
device such as device 7 or F of the invention in  
10 "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM"  
illustrated in FIGURES 1 - 5. Device 7, best seen in  
FIGURES 6 - 9, has a filter body (51) constructed of  
stainless steel or other food grade, nontoxic materials  
developed with the purpose of obtaining high quality and  
15 large quantities of juice from citrus fruit and other  
round or near-round non-citrus fruit.

          The main body (51) of the filter is in a tubular  
cylindrical shape where at one extreme end a removable  
cylindrical perforating cutting edge (52) is attached, by  
20 threads or other methods, and is constructed so as to  
terminate in a sharp knife edged circular point (53),  
which functions by first perforating the fruit's peel in  
a manner such that permits the pumping action of a





Effect" which accelerates juice flow from the inside to the outside of the filter, thus promoting greater juice (J) yield and greater productivity by helping to maintain these passageways clear of obstructions and reducing clogging and cleaning frequency.

FIGURE 1 shows, as an example, a juice extraction machine, where one can observe the positioning of the self-cleaning filters (7 or F), object of this application for "IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," where all byproducts of extraction, such as juice (J), extracted from the fruit's core (C) and peel skin strips (P) were obtained from the fruit (19 or R). Also shown in FIGURE 1, is the layout of the fruit bin placement as well as the fixed peeler cups (3) and moveable peeler cups (4) and the linear actuator (2) which drives the moveable peeler cups (4) against the fixed peeler cups (3) while simultaneously actuating the feeder spring (5) which permits the continuous and synchronized feeding of fruit (R) for juice (J) extraction.

In the third embodiment or version 100 (the 100 series is used to identify identical components to the



of said moveable peeler cups (104) is solidly transmitted to vertical rods (106), in a synchronized manner such that these vertical rods will touch and initiate a linear dislodging of the feeder mechanism's spring (105), thus  
5 allowing one of the fruit (119) to drop through the feeder duct and into the chamber formed by the intermeshing of the moveable peeler cup (104) and its matched pair fixed peeler cup (103).

In continuation of the extraction cycle, the fruit  
10 (119) now held in the chamber formed by the intermeshing of the moveable peeler cup (104) and its matched pair fixed peeler cup (103), is then pressed by the moveable peeler cup (104) into the fixed peeler cup (103), since both have multiple radially cut openings, the action  
15 causes the skin of the fruit to be sheared in multiple strips (112) which pass through the peeler cups' radial openings and fall vertically, while the fruit's core (113) is taken inside the filtering device (107) since this filtering device has a circular sharp cutting point  
20 (such as point 53 of filtering device 7) at its forward opening, permitting the fruit's core (113) to enter completely into the filter (107), which has radially cuts slits which allow for the extracted juice (111) to flow

through and be collected in the space formed by the inside of the fixed peeler cup (103) and the juice collector (110).

In the final stages of the extraction cycle, as the  
5 moveable peeler cups (104) move back and away from the fixed peeler cups (103), linear actuators (116) drive the pull rods (115, 169) which in turn are attached to a transverse cross member (109) to which the plunger (108) is firmly fixed, thus driving said plunger (108) to  
10 travel through the filter and to push directly on the fruit's core (113) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core is forced (by a following core) through the chamber (145) positioned at the inner or back end of  
15 moveable peeler cup (104), and is directed to further pass through the fruit core receiving duct (114) which is integral with core chamber (145) and angulated downwardly so that the fruit's core (113) can actually fall under the force of gravity through the duct (114), in a manner  
20 so that all of the by-products being produced: juice (111), peel (112) and core (113), can now be directed respectively to other stages of processing. With the moveable peeler cup (104) in the full open position, the

machine is ready to commence another fruit juice extraction cycle. Given that the geometry and configuration is as shown, one can see that the pair of peeler cups (103) and (104) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical and fully described above.

Embodiment 100 also includes clean-in-place spray nozzles (121) mounted at different positions on structural chassis (101), in a manner such that liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic cleaning of the machine at predetermined time periods as deemed necessary.

In the fourth embodiment or version 200 (the 200 series is used to identify identical components to the first through third embodiments unless a specific description is given, i.e., filtering device 207 is identical to filtering devices 7 and 107), as best seen in FIGURES 12 - 13, a linear actuator (202) drives both external moveable peeler cups (203) and internal moveable







53 of filtering device 7) at its forward opening, permitting the fruit's core (213) to enter completely into the filter (207), which has radially cuts slits which allow for the extracted juice (211) to flow through and be collected in the space formed by the inside of the external moveable peeler cup (203) and the juice collector (210).

In the final stages of the extraction cycle, as the internal moveable peeler cups (204) move back and away from the external moveable peeler cups (203), linear actuator (202) drives the peeler cup supports (222, 223) which in turn are attached to a transverse cross member (209) to which the plunger (208) is firmly fixed, thus driving said plunger (208) to travel through the filter (207) and to push directly on the fruit's core (213) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core is forced (by a following core) through the chamber (245) positioned at the inner or back end of internal moveable peeler cup (204), and is directed to further pass through the fruit core receiving duct (214) which is integral with core chamber (245) and angulated downwardly so that the fruit's core (213) can actually fall under the force

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of gravity through the duct (214), in a manner so that all of the by-products being produced: juice (211), peel (212) and core (213), can now be directed respectively to other stages of processing. With the internal moveable peeler cup (204) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Given that the geometry and configuration is as shown, one can see that the pair of moveable peeler cups (203) and (204) at one end of the machine will be out of phase (but not by 180 degrees) with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical and fully described above.

15        Embodiment 200 also includes clean-in-place spray nozzles (221) mounted at different positions on structural chassis (201), in a manner such that liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic  
20        cleaning of the machine at predetermined time periods as deemed necessary.

What is claimed as invention is:

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1. "IMPROVEMENTS IN A MODULAR FRUIT JUICE  
EXTRACTION SYSTEM," an invention composed of two fixed  
peeler cups (3) attached to a structural chassis (1) and  
two matching moveable peeler cups (4), one pair of fixed  
5 and moveable peeler cups (3) and (4), each pair located  
at opposite ends of the machine, where the moveable  
peelers cups (4) are each attached to opposite ends of a  
single linear actuator (2), which can employ various  
drive technologies, including hydraulic, pneumatic,  
10 electric, geared, screw and/or any combination of known  
linear drive systems that, in a back and forth cycle,  
drives both movable peeler cups (4). The system is  
composed of a moveable peeler cup (4) at each of the  
extreme ends of the linear actuator (2), driven in a  
15 manner that maximizes the productivity of the drive  
motion, since when one peeler cup (4) is opening to allow  
a fruit (19) to fall within its concave and radially cut  
chamber, formed in conjunction with its matching pair  
fixed peeler cup (3), at the same time the moveable  
20 peeler cup (4) at the opposite end of linear actuator (2)  
is closing upon the fruit (19) inside the chamber formed  
by the intermeshing of peeler cups (3) and (4), and  
shearing the fruit's skin (12) as it initiates the

peeling process and continues on to complete the juicing cycle by pumping the fruit's core (13) into the filtering device (7) and, since this filtering device has a circular sharp cutting point at its forward opening, it permits the fruit's core (13) to enter completely into the filter (7), which has radially cuts slits which allow for the extracted juice (11) to flow through and be collected in the space formed by the inside of the fixed peeler cup (3) and the juice collector (10), followed by the motion of plunger (8) which travels through the filter and pushes directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of these byproducts being produced: juice (11), peel (12) and core (13), can now be separately directed to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4)

at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4),  
5 the juice extraction cycle is exactly identical.

2. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a first version in which in the final stages of the extraction cycle, as the moveable  
10 peeler cups (4) move back and away from the fixed peeler cups (3), linear actuators (16) drive the pull rods (15), which in turn are attached to a transverse cross member (9) to which the plunger (8) is firmly fixed, thus drive said plunger (8) to travel through the filter and push  
15 directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the  
20 fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed separately to other stages of processing. With the moveable peeler cup (4) in

the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the geometry and configuration is symmetrical as shown, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

3. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a second version in which in the final stages of the extraction cycle, driven by the action of linear actuator (2), the moveable peeler cup

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(4) moves back and away from the fixed peeler cup (3), and since it is solidly fixed to a transverse cross member (20), causes the simultaneous driving of said cross member (20), which in turn is attached through the pull rods (15) to another transverse cross member (9) at the opposite end, to which plunger (8) is firmly fixed, thus driving said plunger (8) to travel through the filter and push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter (7) and, finally, the dried fruit core (13) falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed separately to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the geometry and configuration is symmetrical as shown, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the

machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle.

5 Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the  
10 machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

4. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a third version (NOT SHOWN)  
15 comprehended by yet another manner of driving the plunger (8). By placing a linear actuator fixed directly to structural chassis (1) and attaching the driving end of said actuator to plunger (8), actuation will drive said plunger (8) to travel through the filter and push  
20 directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4)



peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

15           5.    "IMPROVEMENTS    IN    A    MODULAR    FRUIT    JUICE  
EXTRACTION SYSTEM," an invention configured as described  
in CLAIM 1, characterized by including, in all  
configurations and versions, clean-in-place spray nozzles  
(21) mounted at different positions on structural chassis  
20   (1), in a manner such that, liquid and/or vaporized  
sprays can be utilized automatically, controlled by  
computer or other methods, for automatic cleaning of the  
machine at predetermined time periods as deemed



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actuator for driving both movable peeler cups in a back  
and forth cycle, said moveable peeler cup at each of the  
ends of said linear actuator being driven in a manner  
such that when one of said peeler cups is opening to  
5 allow an article of fruit to fall within its concave  
chamber formed in conjunction with its mating fixed  
peeler cup, said moveable peeler cup at the opposing end  
of said linear actuator is closing upon said fruit inside  
said chamber formed by the intermeshing of said moveable  
10 and fixed peeler cups, and shearing said fruit's skin as  
it initiates the peeling process and continues to  
complete the juicing cycle by pumping said fruit's core  
through a filtering means mounted in said mating fixed  
peeler cup, said filtering means having a cutting point  
15 at its forward opening and radially cut slits to permit  
said fruit's core to enter completely into said filtering  
means which allows for the extracted juice to flow  
through and be collected in juice collection means  
connected to said fixed peeler cup, followed by the  
20 motion of a plunger which travels through said filtering  
means and pushes directly on said fruit's core until said  
core is expelled completely from the forward end of said  
filtering means and, whereby, the dried fruit core of

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said fruit falls into and through the chamber formed by  
said fixed and moveable peeler cups, and is directed to  
further fall through a fruit core receiving means,  
whereby when said moveable peeler cup is in the full open  
5 position, said apparatus is positioned to commence  
another fruit juice extraction cycle.

8. The apparatus of CLAIM 7, wherein said pair of  
peeler cups positioned at one end of said apparatus are  
180 degrees out of phase with respect to said pair of  
10 peeler cups at the opposing end of said apparatus.

9. The apparatus of CLAIM 7, wherein when said  
moveable peeler cups move back and away from said fixed  
peeler cups, said linear drive actuator drives said  
plunger through said filtering means, whereby said  
15 fruit's core is expelled completely from the forward end  
of said filtering means and the dried fruit core falls  
into and through said chamber formed by said fixed and  
moveable peeler cups.

10. The apparatus of CLAIM 7, further comprising  
20 spray nozzles mounted at selected positions on said  
chassis.

11. A fruit juice extraction apparatus comprising:  
a chassis having mounted thereon juice

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extraction means;

5 said juice extraction means having means for storing said fruit, said storing means having a plurality of apertures therein for allowing articles of said fruit to be deposited between at least two pairs of mating concave hemispheres, each of said pairs having one movable and one fixed hemisphere;

10 drive means for actuating means for forcing each of the movable of said concave hemispheres against its mating fixed concave hemisphere, thereby pressing an article of said fruit deposited between said hemispheres;

15 each of said movable concave hemispheres having a central pin and each of said fixed concave hemispheres having a perforating tube for the extraction of juice from said article of fruit, whereby the solid residue is deposited in a receptacle and the liquid is passed through a filter and then falls into a reservoir which has outlet ports therein.

20 12. The apparatus of CLAIM 11, wherein said perforating tube has multiple transverse slits of increasing diameter from inside to outside.

13. The apparatus of CLAIM 11, wherein each of said concave hemispheres having its concave surface defined by

a plurality of spaced-apart radial blades.

14. The apparatus of CLAIM 13, wherein said radial blades of each of said hemispheres are of at least two different lengths.

5           15. The apparatus of CLAIM 14, wherein when said movable hemisphere is forced against its mating fixed hemisphere, said radial blades of said movable hemisphere are positioned intermediate said radial blades of said fixed hemisphere.

10           16. The apparatus of CLAIM 11, wherein said movable hemispheres are attached to opposing ends of said forcing means for driving both movable hemispheres in a back and forth cycle, said moveable hemispheres at each of the ends of said forcing means being driven in a manner such  
15           that when one of said movable hemispheres is opening to allow said article of fruit to fall between it and its mating fixed hemisphere, said moveable hemisphere at the opposing end of said forcing means is closing upon said fruit between it and said other of said fixed hemispheres  
20           and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by forcing said fruit's core through its said perforating tube, whereby extracted juice flows to said

reservoir.

17. The apparatus of CLAIM 16, further comprising a plunger which moves through each of said tubes and expels said fruit's core from the forward end of said tubes and, whereby when one of said moveable hemispheres is in the full open position, said apparatus is positioned to commence another fruit juice extraction cycle.

18. "IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," consisting of a cylindrical filter body (1) constructed of stainless steel or other food grade, nontoxic materials, where at one extreme end a removable cylindrical perforating cutting edge (2) is attached, by threads or other methods, and is constructed so as to terminate in a sharp knife edged circular point (3), which functions by first perforating the fruit's peel in a manner such that permits the pumping action of a moveable peeler cup (6) (a concave and radially cut hemisphere) to force a core section of fruit (C) to enter completely into said filter (F), and since the main body (1) of the filter is of a tubular cylindrical shape and is configured to have a multitude of transverse radial

slits (4) with conical, or V-shaped, format, positioned parallel with respect to each other (5), and which can be spaced and sized variably, dependent on the juice (J) can produce many juice products with varying desired characteristics. The nature and numbers of the multitude of transverse radial slits (4) with conical, or V-shaped, generate greater efficiency and yield in juice extraction, due to a pressure differential between the inside and outside portions of the filter, inducing a "Venturi Effect" which accelerates juice flow from the inside to the outside of the filter, thus promoting greater juice (J) yield and greater productivity by helping to maintain these passageways clear of obstructions and reducing clogging and cleaning frequency.

19. A filter for use in an apparatus for the extraction of fruit juice comprising:

a cylindrical filter body having connected at one end thereof a removable cylindrical perforating cutting edge terminating in a circular point, for perforating the peel of an article of fruit, whereby a moveable concave and radially cut hemisphere of said apparatus forces a core section of said fruit to enter said filter body,



said filter body having a plurality of spaced-apart parallel transverse radial slits therein.

20. The filter of CLAIM 19 wherein said filter body is of nontoxic materials.

5           21. A fruit juice extraction apparatus comprising:  
a chassis having mounted thereon juice extraction means;

          said juice extraction means having means for storing said fruit, said storing means having a plurality  
10 of apertures therein for allowing articles of said fruit to be deposited between at least two pairs of mating radially cut and concave hemispheres, each of said pairs having one movable and one fixed hemisphere;

          drive means for actuating means for forcing  
15 each of the movable of said concave hemispheres against its mating fixed concave hemisphere, thereby pressing an article of said fruit deposited between said hemispheres;

          each of said movable concave hemispheres having a central pin and each of said fixed concave hemispheres  
20 having a perforating tube for the extraction of juice from said article of fruit, whereby the solid residue is deposited in a receptacle and the liquid is passed through a filter and then falls into a reservoir which

has outlet ports therein;

5 said filter comprising a cylindrical filter body of nontoxic materials, having connected at one end thereof a removable cylindrical perforating cutting edge terminating in a circular point, for perforating the peel of said article of fruit, whereby said moveable concave and radially cut hemisphere forces a core section of said fruit to enter said filter body, said filter body having a plurality of spaced-apart parallel transverse radial  
10 slits.

22. The apparatus of CLAIM 21, wherein said transverse slits are of increasing diameter from inside to outside.

23. A fruit juice extraction apparatus comprising:  
15 two fixed peeler cups and two moveable peeler cups attached to a chassis in mating pairs of fixed and moveable peeler cups, said cups being concave hemispheres, each pair being located at opposing ends of said chassis, where said moveable peeler cups are each  
20 attached to opposing ends of a single linear drive actuator for driving both movable peeler cups in a back and forth cycle, said moveable peeler cup at each of the ends of said linear actuator being driven in a manner

such that when one of said peeler cups is opening to  
allow an article of fruit to fall within its concave  
chamber formed in conjunction with its mating fixed  
peeler cup, said moveable peeler cup at the opposing end  
5 of said linear actuator is closing upon said fruit inside  
said chamber formed by the intermeshing of said moveable  
and fixed peeler cups, and shearing said fruit's skin as  
it initiates the peeling process and continues to  
complete the juicing cycle by pumping said fruit's core  
10 through a filtering means mounted in said mating fixed  
peeler cup, said filtering means having a cutting point  
at its forward opening and radially cut slits to permit  
said fruit's core to enter completely into said filtering  
means which allows for the extracted juice to flow  
15 through and be collected in juice collection means  
connected to said fixed peeler cup, followed by the  
motion of a plunger which travels through said filtering  
means and pushes directly on said fruit's core until said  
core is expelled completely from the forward end of said  
20 filtering means and, whereby, the dried fruit core of  
said fruit is forced through said moveable peeler cups,  
and is directed to further fall through a fruit core  
receiving means, whereby when said moveable peeler cup is

in the full open position, said apparatus is positioned to commence another fruit juice extraction cycle.

24. The apparatus of CLAIM 23, wherein said pair of peeler cups positioned at one end of said apparatus are  
5 180 degrees out of phase with respect to said pair of peeler cups at the opposing end of said apparatus.

25. The apparatus of CLAIM 23, wherein when said moveable peeler cups move back and away from said fixed peeler cups, said linear drive actuator drives said  
10 plunger through said filtering means, whereby said fruit's core is expelled completely from the forward end of said filtering means and the dried fruit core falls into and through said chamber formed by said fixed and moveable peeler cups.

26. The apparatus of CLAIM 23, further comprising  
15 spray nozzles mounted at selected positions on said chassis.

27. The apparatus of CLAIM 23, channel means is positioned in said moveable peeler cups to direct said  
20 fruit forced through said moveable peeler cups to further fall through a fruit core receiving means, said receiving means be angulated downwardly with respect to the said moveable peeler cup within which it is positioned.

28. A fruit juice extraction apparatus comprising:  
a chassis having mounted thereon juice  
extraction means;

5 said juice extraction means having means for  
storing said fruit, said storing means having a plurality  
of apertures therein for allowing articles of said fruit  
to be deposited between at least two pairs of mating  
concave hemispheres, each of said pairs having one  
movable and one fixed hemisphere;

10 drive means for actuating means for forcing  
each of the movable of said concave hemispheres against  
its mating fixed concave hemisphere, thereby pressing an  
article of said fruit deposited between said hemispheres;

15 each of said movable concave hemispheres having  
a central pin and each of said fixed concave hemispheres  
having a perforating tube for the extraction of juice  
from said article of fruit, whereby the solid residue is  
deposited in a receptacle and the liquid is passed  
through a filter and then falls into a reservoir which  
20 has outlet ports therein and the dried fruit core of said  
fruit is forced through said moveable peeler cups.

29. The apparatus of CLAIM 28, wherein said  
perforating tube has multiple transverse slits of





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formed in conjunction with its mating external peeler cup, said internal moveable peeler cup at the opposing end of said linear actuator is closing upon said fruit inside said chamber formed by the intermeshing of said  
5 internal and external moveable peeler cups, and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by pumping said fruit's core through a filtering means mounted in said mating fixed peeler cup, said filtering means having a  
10 cutting point at its forward opening and radially cut slits to permit said fruit's core to enter completely into said filtering means which allows for the extracted juice to flow through and be collected in juice collection means connected to said fixed peeler cup,  
15 followed by the motion of a plunger which travels through said filtering means and pushes directly on said fruit's core until said core is expelled completely from the forward end of said filtering means and, whereby, the dried fruit core of said fruit is forced through said  
20 internal moveable peeler cups, and is directed to further fall through a fruit core receiving means, whereby when said moveable peeler cup is in the full open position, said apparatus is positioned to commence another fruit



juice extraction cycle.

36. The apparatus of CLAIM 35, wherein said pair of peeler cups positioned at one end of said apparatus are 180 degrees out of phase with respect to said pair of peeler cups at the opposing end of said apparatus.

37. The apparatus of CLAIM 35, wherein when said internal moveable peeler cups move back and away from said external peeler cups, said linear drive actuator drives said plunger through said filtering means, whereby said fruit's core is expelled completely from the forward end of said filtering means and the dried fruit core falls into and through said chamber formed by said internal and external moveable peeler cups.

38. The apparatus of CLAIM 35, further comprising spray nozzles mounted at selected positions on said chassis.

39. The apparatus of CLAIM 35, channel means is positioned in said internal moveable peeler cups to direct said fruit forced through said internal moveable peeler cups to further fall through a fruit core receiving means, said receiving means be angulated downwardly with respect to the said internal moveable peeler cup within which it is positioned.

40. A fruit juice extraction apparatus comprising:  
a chassis having mounted thereon juice  
extraction means;

5 said juice extraction means having means for  
storing said fruit, said storing means having a plurality  
of apertures therein for allowing articles of said fruit  
to be deposited between at least two pairs of mating  
concave hemispheres, each of said pairs having one  
internal movable and one external moveable hemisphere;

10 drive means for actuating means for forcing  
each of the internal movable of said concave hemispheres  
against its mating external moveable concave hemisphere,  
thereby pressing an article of said fruit deposited  
between said hemispheres;

15 each of said external movable concave  
hemispheres having a central pin and each of said  
internal moveable concave hemispheres having a  
perforating tube for the extraction of juice from said  
article of fruit, whereby the solid residue is deposited  
20 in a receptacle and the liquid is passed through a filter  
and then falls into a reservoir which has outlet ports  
therein and the dried fruit core of said fruit is forced  
through said internal moveable peeler cups.

41. The apparatus of CLAIM 40, wherein said perforating tube has multiple transverse slits of increasing diameter from inside to outside.

42. The apparatus of CLAIM 41, wherein each of said  
5 concave hemispheres having its concave surface defined by a plurality of spaced-apart radial blades.

43. The apparatus of CLAIM 42, wherein said radial blades of each of said hemispheres are of at least two different lengths.

10 44. The apparatus of CLAIM 43, wherein when said internal movable hemisphere is forced against its mating external moveable hemisphere, said radial blades of said internal movable hemisphere are positioned intermediate said radial blades of said fixed hemisphere.

15 45. The apparatus of CLAIM 41, wherein said internal movable hemispheres are attached to opposing ends of said forcing means for driving both internal movable hemispheres in a back and forth cycle, said internal moveable hemispheres at each of the ends of said  
20 forcing means being driven in a manner such that when one of said internal movable hemispheres is opening to allow said article of fruit to fall between it and its mating external moveable hemisphere, said internal moveable





fruit's core (13) into the filtering device (7) and, since this filtering device has a circular sharp cutting point at its forward opening, it permits the fruit's core (13) to enter completely into the filter (7), which has  
5 radially cuts slits which allow for the extracted juice (11) to flow through and be collected in the space formed by the inside of the fixed peeler cup (3) and the juice collector (10), followed by the motion of plunger (8) which travels through the filter and pushes directly  
10 on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit  
15 core receiving duct (14), in a manner so that all of these by-products being produced: juice (11), peel (12) and core (13), can now be directed separately to other stages of processing. Three possible versions can be deployed for actuating the plunger (8), but in all cases,  
20 the objective is to drive said plunger (8) to travel through the filter and to push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the  
25 fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct

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(14), in a manner so that all of these byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively to other stages of processing. In all versions, clean-in-place spray nozzles (21) are mounted at different positions on structural chassis (1), in a manner such that, liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic cleaning of the machine at predetermined time periods as deemed necessary. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

"IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," consisting of a cylindrical filter (50) having a body (51) constructed of stainless steel or other food grade, nontoxic materials, where at one extreme end a removable cylindrical perforating cutting edge (52) is attached, by threads or other methods, and is constructed so as to terminate in a sharp knife edged





filter (F), where simultaneously, due to the high pressure generated by the action, the juice (J) is forced to flow through the multitude of conically shaped transverse radial slits that are positioned parallel with respect to each other, thus separating and filtering the liquid juice (J) from solid components of the fruit's core (C). The removable cylindrical perforating cutting edge (52) simplifies replacement and permits for interchangeability with differently shaped cutting edges which can vary as desired in order to obtain greater juice (J) extraction performance, or higher juice quality, from the many varieties of citrus and other fruit.

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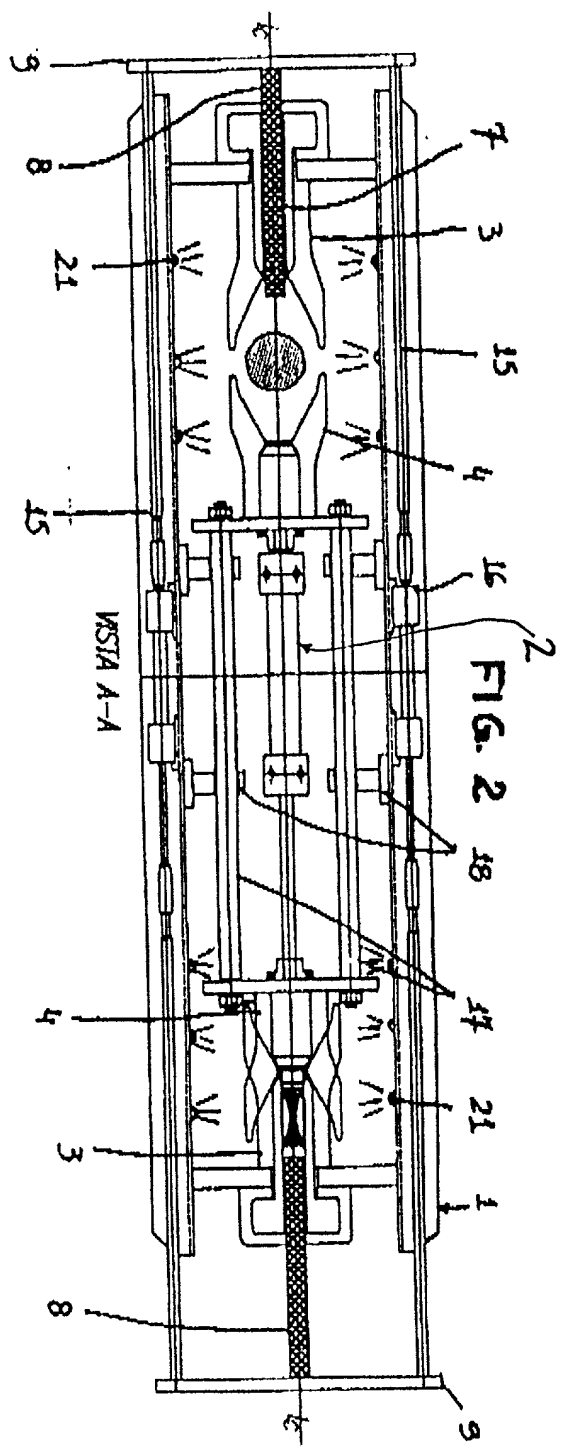
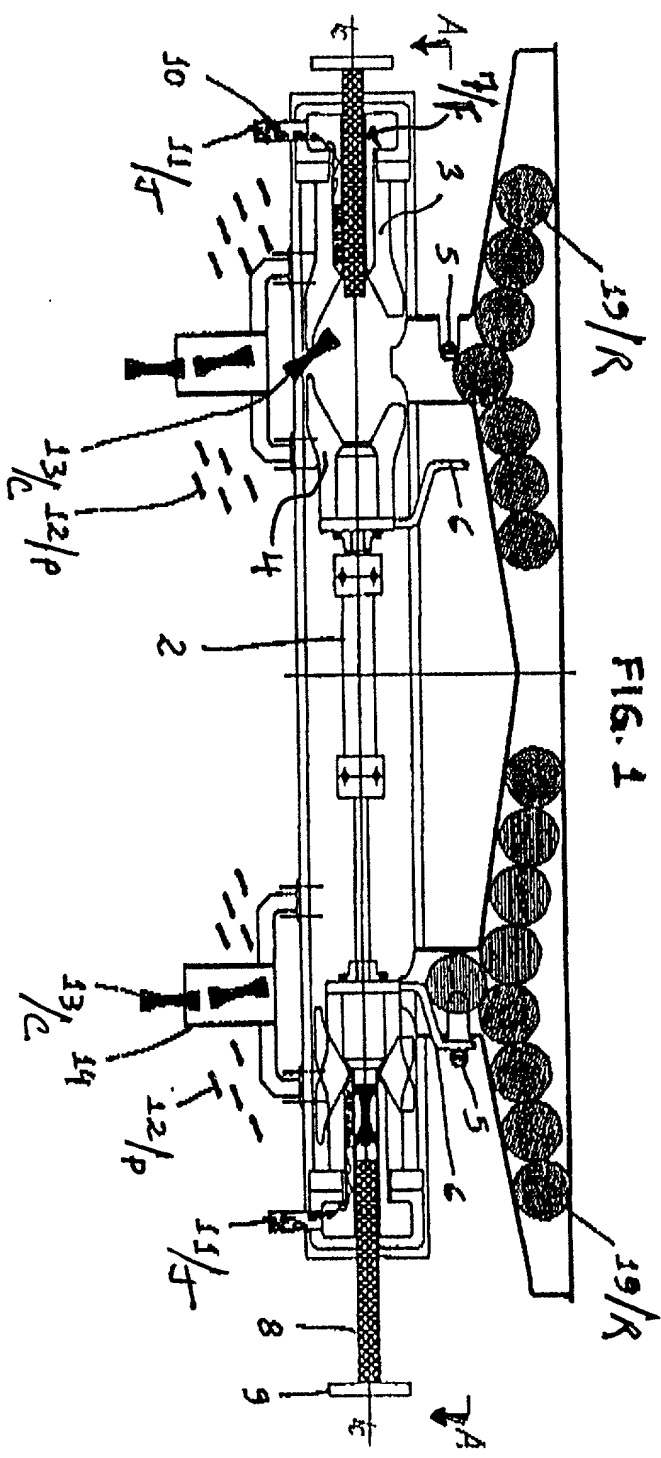


FIG. 3

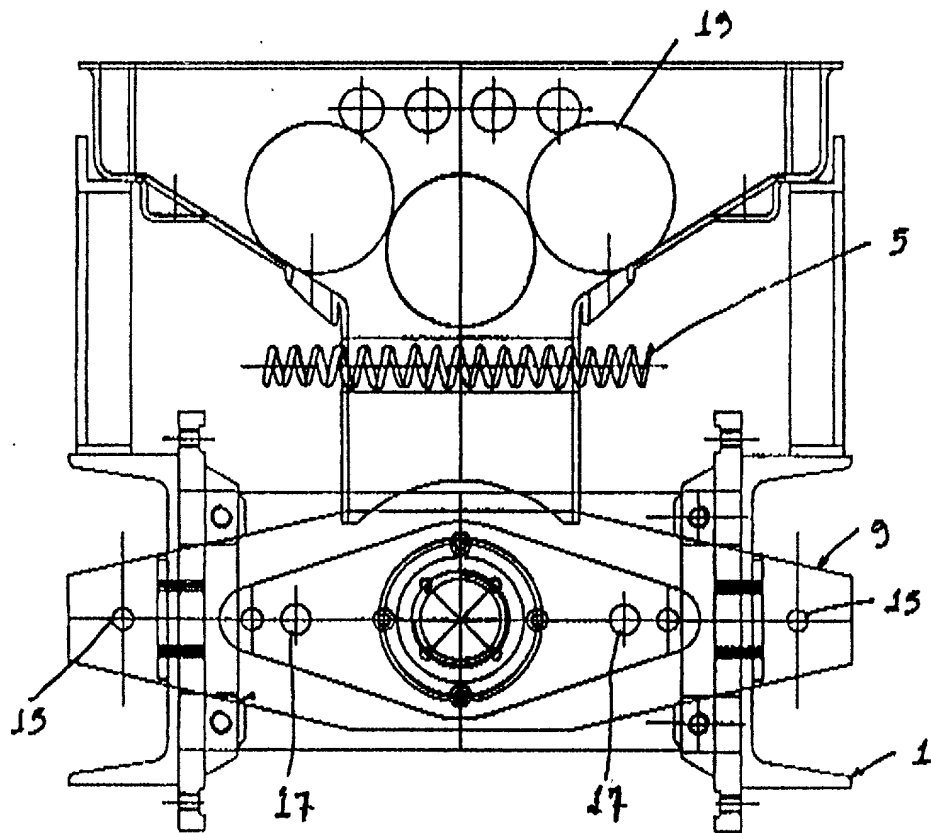


FIG. 4

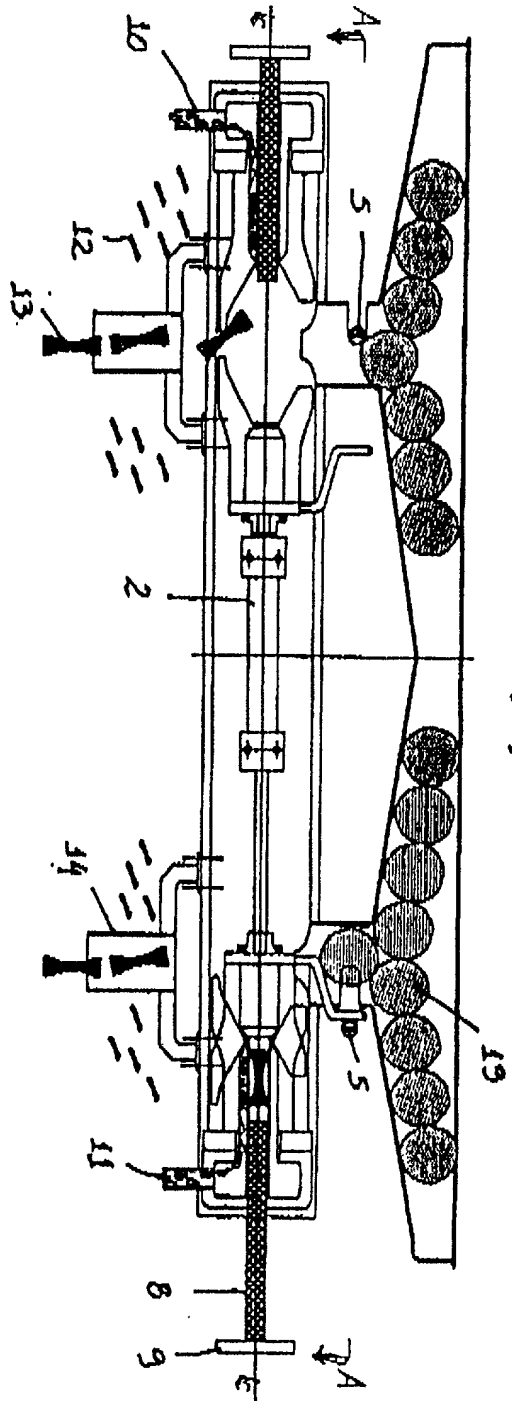


FIG. 5

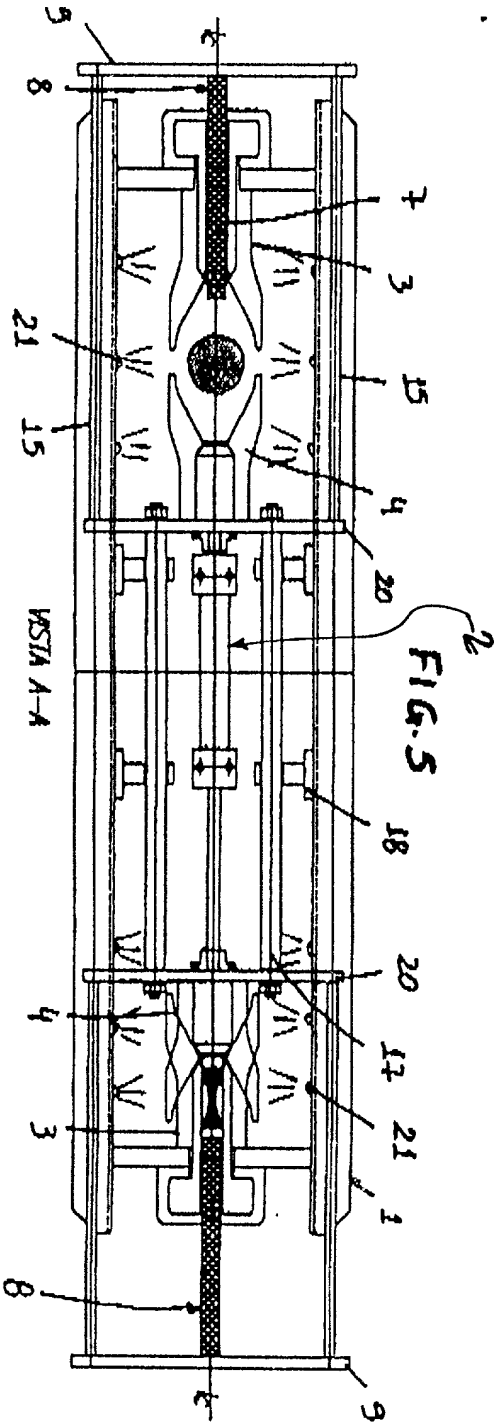
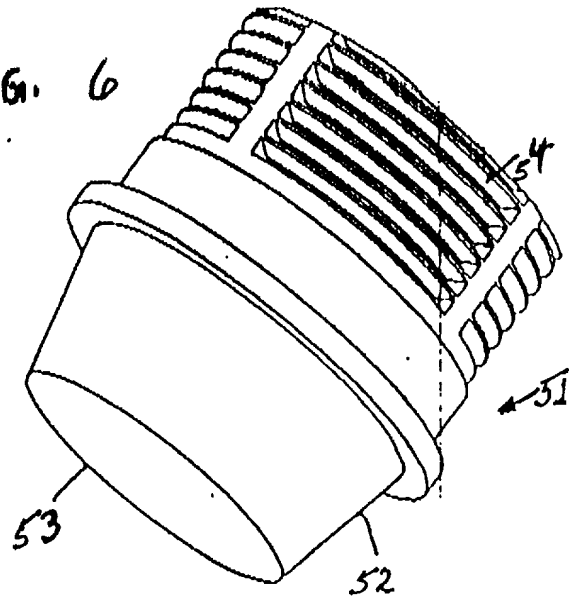


FIG. 6



DETAIL A

FIG. 7

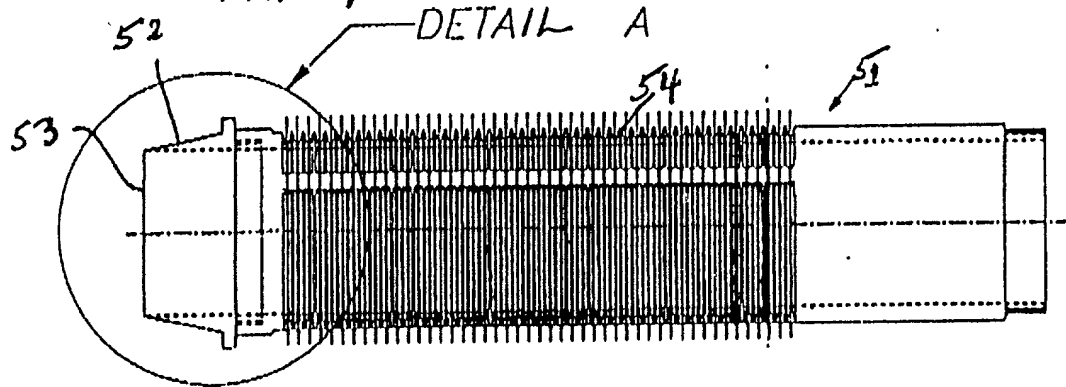
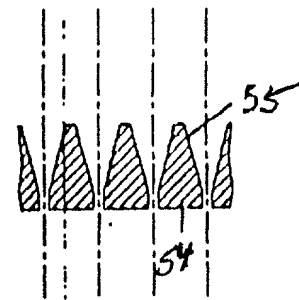
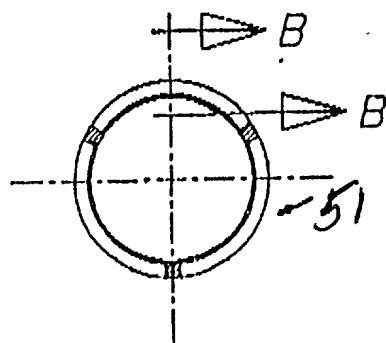


FIG. 9



CUT BB

FIG. 8



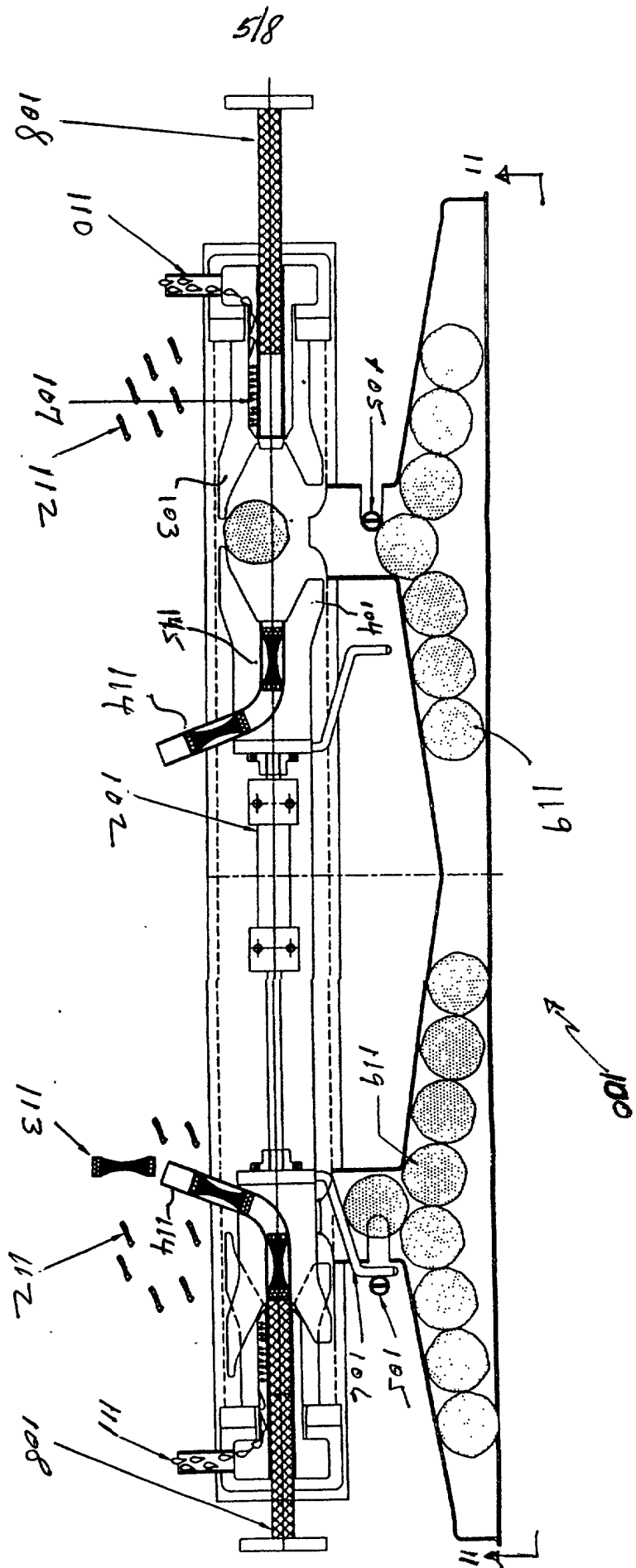
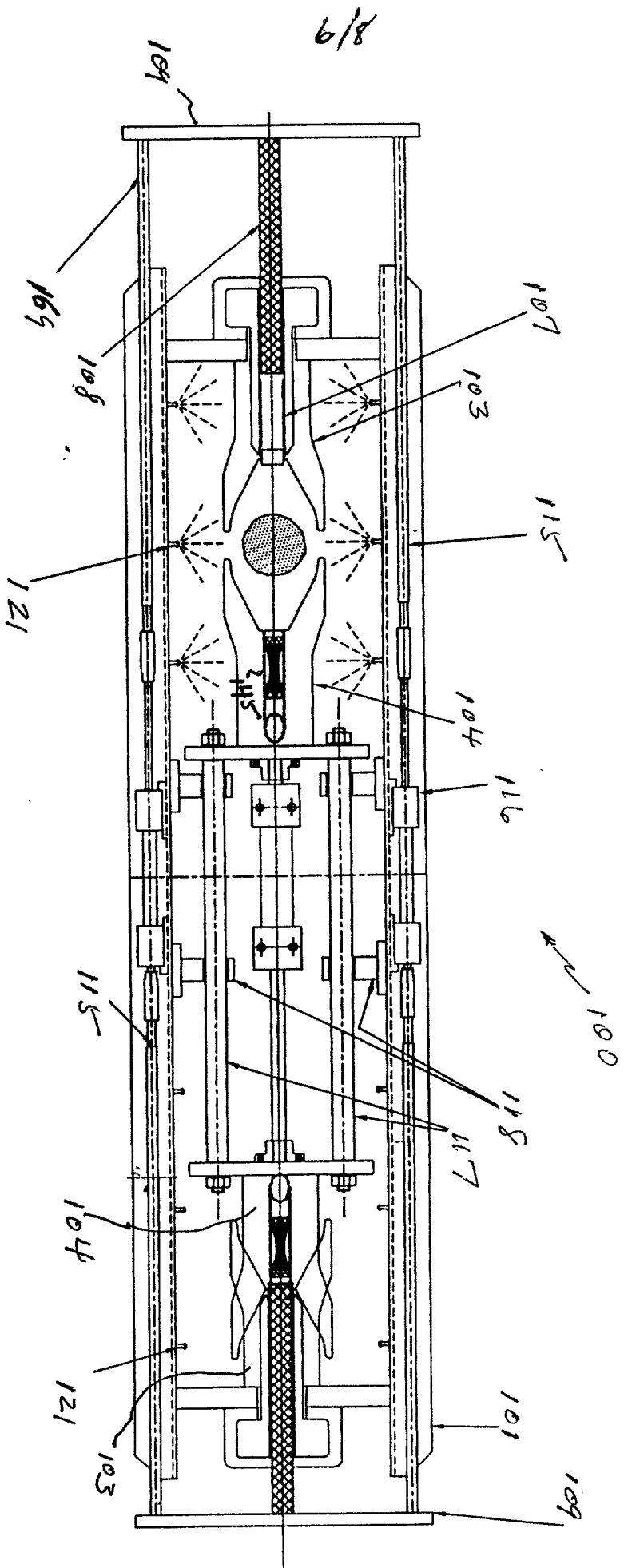


FIG 10



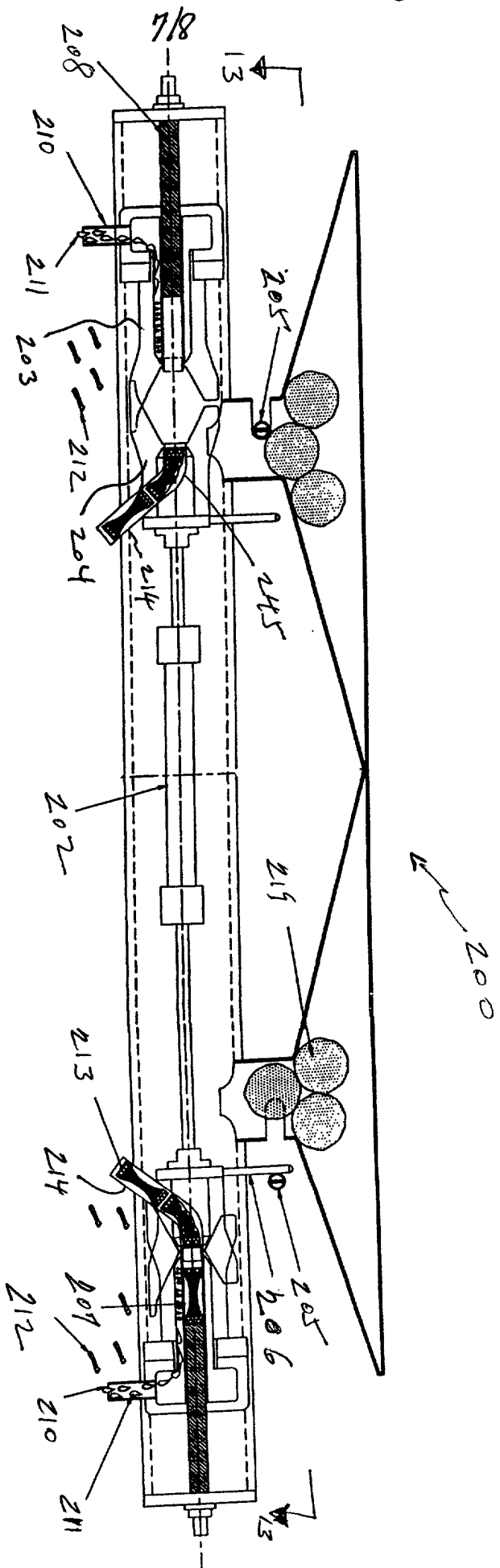


FIG. 12



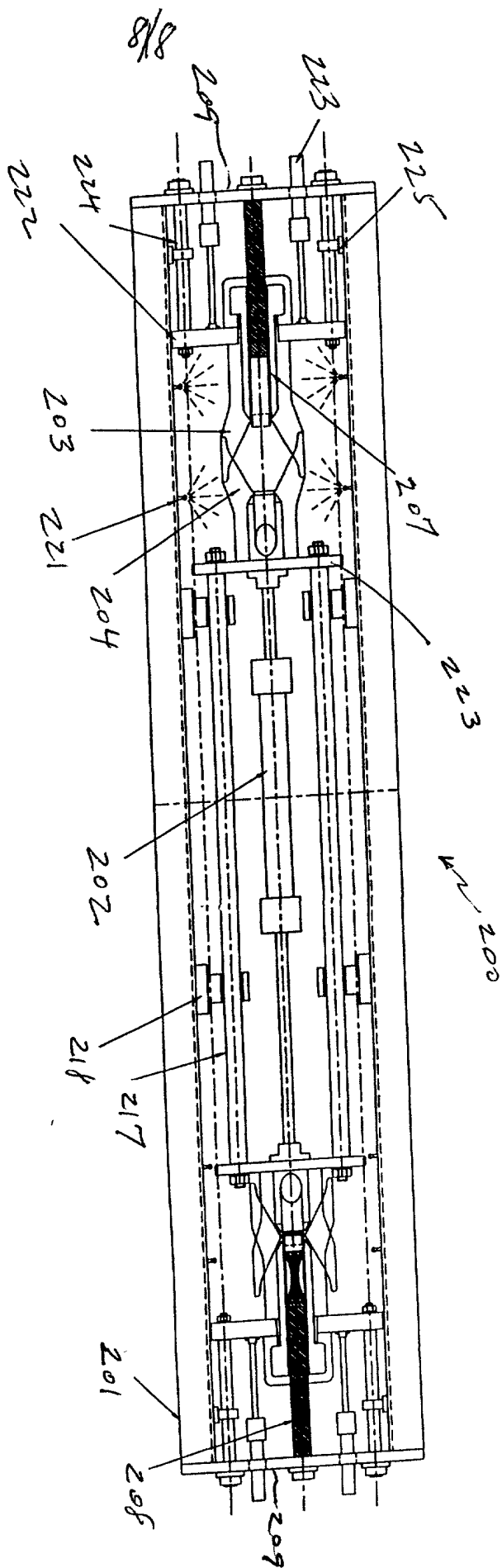


FIG 13

which is described and claimed in the attached specification;  
that this application in part discloses and claims subject matter disclosed in my earlier filed  
pending applications:

that I specifically acknowledge my duty to disclose material information as defined in 37 CFR § 1.56(a) which occurred between the filing date of the prior application and the filing date of this continuation-in-part application which discloses and claims subject matter in addition to that disclosed in the prior application (37 CFR § 1.63(d)). I was aware of this duty before I signed the "Declaration And Power Of Attorney - Original Application," originally filed with the application.

that I have reviewed and understand the contents of the specification, including the claims; that as to the subject matter of this application which is common to said earlier application, I do not know and do not believe that the same was ever known or used in the United States of America before my or our invention thereof or patented or described in any printed publication in any country before my or our invention thereof, or more than one year prior to said earlier application, or in public use or on sale in the United States of America more than one year prior to said earlier application;

as to applications for patents or inventor's certificate on the common subject matter filed in any country foreign to the United States of America, prior to said earlier application by me or my legal representatives or assigns,

4x) such applications have been filed as follows:

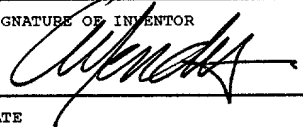
COUNTRY	APPLICATION NUMBER	DATE OF FILING (DAY, MO., YR.)	DATE OF ISSUE (DAY, MO., YR.)	PRIORITY CLAIMED UNDER 35 USC 119
BRAZIL	See SCHEDULE A Attached			YES (xx) NO ( )
				YES ( ) NO ( )


that said non-common subject matter has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application; and

(XX) such applications have been filed as follows:

COUNTRY	APPLICATION NUMBER	DATE OF FILING (DAY, MO., YR.)	DATE OF ISSUE (DAY, MO., YR.)	PRIORITY CLAIMED UNDER 35 USC 119
BRAZIL	See SCHEDULE A Attached			YES ( ) NO ( ) <del>XX</del>
				YES ( ) NO ( )


DECLASSIFIED

DECLARATION IN COPENDING APPLICATION CONTAINING ADDITIONAL SUBJECT MATTER - PAGE 2 OF 2		ATTORNEY'S DOCKET NO.: M-95-3195 -U.20-CIP
POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration no.)  <div style="text-align: center;">George A. BODE Reg. No. 30,028</div>		
SEND CORRESPONDENCE TO:	George A. Bode BODE & ASSOCIATES, P.C. 2314 Broadway New Orleans, LA 70125-4128	DIRECT TELECOMMUNICATIONS TO: (name and telephone & fax numbers) George A. BODE Tele: (504) 861-8288 Fax: (504) 866-6717
MEDES	Carlos	Neto
<i>Family Name</i>	<i>First Given Name</i>	<i>Second Given Name</i>
Araraquara	Brazil	Brazil
<i>City</i>	<i>State or Foreign Country</i>	<i>Country of Citizenship</i>
Avenida Eng Camilo DiNucci 5717	Araraquara, S.P.	Brazil
<i>Post Office Address</i>	<i>City</i>	<i>State &amp; Zip Code/Country</i>
<i>Family Name</i>	<i>First Given Name</i>	<i>Second Given Name</i>
<i>City</i>	<i>State or Foreign Country</i>	<i>Country of Citizenship</i>
<i>Post Office Address</i>	<i>City</i>	<i>State &amp; Zip Code/Country</i>
<i>Family Name</i>	<i>First Given Name</i>	<i>Second Given Name</i>
<i>City</i>	<i>State or Foreign Country</i>	<i>Country of Citizenship</i>
<i>Post Office Address</i>	<i>City</i>	<i>State &amp; Zip Code/Country</i>
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.		
SIGNATURE OF INVENTOR	SIGNATURE OF INVENTOR	SIGNATURE OF INVENTOR
 DATE 11 July 2000	DATE	DATE

INVENTOR: CARLOS NETO MENDES  
Rua Voluntários de Pátria, 1738  
Araraquara, São Paulo, BRAZIL  
CEP 14.801-320

"IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION  
SYSTEM and CONFIGURATION FOR A SELF-CLEANING FILTER FOR  
THE EXTRACTION OF FRUIT JUICE"

This application is a continuation-in-part  
application of previous applications by the same inventor  
bearing:

- 1) U.S. Serial No. 08/647,066 filed May 9, 1996,  
(which claims priority, under 35 U.S. Code § 119 based on  
Brazilian Application No. PI-9502244-9 filed June 19,  
1995), now U.S. Patent No, 5,655,441 issued August 12,  
1997;
- 2) U.S. Serial No. 08/681,627 filed July 29, 1996,  
(which claims priority, under 35 U.S. Code § 119 based on  
Brazilian Application No. MI-5501198-5 filed August 1,  
1995) now U.S. Patent No, 5,720,218 issued February 24,  
1998;
- 3) U.S. Serial No. 08/681,626 filed July 29, 1996,  
(which claims priority, under 35 U.S. Code § 119 based on  
Brazilian Application No. MU-7501779-2 filed August 1,  
1995);
- 4) U.S. Serial No. 08/759,723 filed December 6,  
1996, (which claims priority, under 35 U.S. Code § 119  
based on Brazilian Application No. MU-7502784-4 filed  
December 8, 1995);
- 5) U.S. Serial No. 08/759,722 filed December 6,  
1996, (which claims priority, under 35 U.S. Code § 119  
based on Brazilian Application No. MU-7502785-2 filed  
December 8, 1995) now U.S. Patent No, 5,720,219 issued  
February 24, 1998;
- 6) U.S. Serial No. 08/759,727 filed December 6,  
1996, (which claims priority, under 35 U.S. Code § 119  
based on Brazilian Application No. MU-7502786-0 filed  
December 8, 1995);
- 7) U.S. Serial No. 08/763,679 filed December 11,  
1996, (which claims priority, under 35 U.S. Code § 119  
based on Brazilian Application No. MU-7502994-4 filed  
December 15, 1995);

**SCHEDULE A**

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8) U.S. Serial No. 08/884,529 filed June 27, 1997, (which claims priority, under 35 U.S. Code § 119 based on Brazilian Applications No. PI-9502218-0 filed June 12, 1995; No. PI-9502244-9 filed June 19, 1995; No. MI-5501197-7 filed August 1, 1995; No. MI-5501198-5 filed August 1, 1995; No. MI-5501199-3 filed August 1, 1995; No. MU-7501779-2 filed August 1, 1995; No. MU-7501780-6 filed August 1, 1995; No. MU-7501781-4 filed August 1, 1995; No. PI-9503518-4 filed August 1, 1995; No. MU-7501563-3 filed August 7, 1995; No. PI-9503109-0 filed August 7, 1995; No. MI-5501053-9 filed August 7, 1995; No. MI-5501976-5 filed December 8, 1995; No. MU-7502784-4 filed December 8, 1995; No. MU-7502785-2 filed December 8, 1995; No. MU-7502786-0 filed December 8, 1995; and, No. MU-7502994-4 filed December 15, 1995);

9) U.S. Serial No. 09/028,187 filed February 23, 1998, (which claims priority, under 35 U.S. Code § 119 based on Brazilian Applications No. PI-9502218-0 filed June 12, 1995; No. PI-9502244-9 filed June 19, 1995; No. MI-5501197-7 filed August 1, 1995; No. MI-5501198-5 filed August 1, 1995; No. MI-5501199-3 filed August 1, 1995; No. MU-7501779-2 filed August 1, 1995; No. MU-7501780-6 filed August 1, 1995; No. MU-7501781-4 filed August 1, 1995; No. PI-9503518-4 filed August 1, 1995; No. MU-7501563-3 filed August 7, 1995; No. PI-9503109-0 filed August 7, 1995; No. MI-5501053-9 filed August 7, 1995; No. MI-5501976-5 filed December 8, 1995; No. MU-7502784-4 filed December 8, 1995; No. MU-7502785-2 filed December 8, 1995; No. MU-7502786-0 filed December 8, 1995; and, No. MU-7502994-4 filed December 15, 1995);

10) U.S. Serial No. 09/377,936 filed August 20, 1999, (which claims priority, under 35 U.S. Code § 119 based on all of the applications in Items 1 - 9 above); and,

11) U.S. Serial No. 09/377,937 filed August 20, 1999, (which claims priority, under 35 U.S. Code § 119 based on all of the applications in Items 1 - 9 above).